

Risk Management Process

Step 1 Situation Awareness

Gather Information

- ☐ Objective(s)
- ☐ Previous Fire Behavior
- ☐ Communication
- ☐ Weather Forecast
- ☐ Who's in Charge
- ☐ Local Factors

Scout the Fire

Step 2 Hazard Assessment

Estimate Potential Fire Behavior Hazards

- ☐ Look Up/Down/Around Indicators

Identify Tactical Hazards

- ☐ Watch Outs

What other safety hazards exist?

Consider severity vs. probability?

Step 3 Hazard Control

Firefighting Orders LCES Checklist - MANDATORY

- ☐ Anchor Point
- ☐ Downhill Checklist (if applicable)

What other controls are necessary?

Step 4 Decision Point

Are controls in place for identified hazards?

NO - Reassess situation YES - Next question

Are selected tactics based on expected fire behavior?

NO - Reassess situation YES - Next question

Have instructions been given and understood?

NO - Reassess situation YES - Initiate action

Step 5 Evaluate

Personnel: Low experience level with local factors?

Distracted from primary tasks?

Fatigue or stress reaction?

Hazardous attitude?

The Situation: What is changing?

Are strategy and tactics working?

Look Up, Down and Around

(Pay special attention to indicators in bold print.)

Fire Environment Factors	Indicators
Fuel Characteristics Assess	Continuous fine fuels Heavy loading of dead and down Ladder fuels Tight crown spacing (<20 ft) Special conditions: Firebrand sources Numerous snags Preheated canopy Frost and bug kill Unusual fine fuels High dead to live ratio
Fuel Moisture Feel and Measure	Low RH (<25%) Low 10 hr FMC (<6%) Drought conditions Seasonal drying
Fuel Temperature Feel and Measure	High Temps (>85F) High % of fuels w/direct sunlight Aspect fuel temp. increasing
Terrain Scout	Steep Slopes (>50%) Chutes – Chimneys Box canyons Saddles Narrow canyons

Look Up, Down and Around

(Pay special attention to indicators in bold print.)

Fire Environment Factors	Indicators
Wind Observe	Surface winds above 10 mph Lenticular clouds High, fast-moving clouds Approaching cold fronts Cumulonimbus development Sudden calm Battling or shifting winds
Stability Observe	Good visibility Gusty winds and dust devils Cumulous clouds Castellatus clouds in the a.m. Smoke rises straight up Inversion beginning to lift Thermal belt
Fuel Temperature Feel and Measure	High Temps (>85F) High % of fuels w/direct sunlight Aspect fuel temp. increasing
Fire Behavior Watch	Leaning column Sheared column Well-developed column Changing column Trees torching Smoldering fires picking up Small firewhirls beginning Frequent spot fires

Common Denominators of Fire Behavior on Tragedy Fires

There are four major common denominators of fire behavior on fatal and near-fatal fires. Such fires often occur:

1. On relatively small fires or deceptively quiet areas of large fires.
2. In relatively light fuels, such as grass, herbs, and light brush.
3. When there is an unexpected shift in wind direction or in wind speed.
4. When fire responds to topographic conditions and runs uphill.

Alignment of topography and wind during the burning period should always be considered a trigger point to re-evaluate strategy and tactics.

Tactical Watch Outs

Position

1. Building fireline downhill.
2. Building underslung or mid-slope fireline.
3. Building indirect fireline, or unburned fuel remains between you and the fire.
4. Attempting frontal assault on the fire, or you are delivered by aircraft to the top of the fire.
5. Terrain and/or fuels make escape to safety zones difficult.

Situation

6. Small fire emerging into a larger fire or an isolated area of a large fire.
7. Suppression resources are fatigued or inadequate.
8. Assignment depends on aircraft support.
9. Night-time operations.
10. Wildland-Urban interface operations.

Each of these Watch Outs require that you implement appropriate hazard control(s).

LCES Checklist

LCES must be established and known to
ALL firefighters **BEFORE** needed.

Lookout(s)

Experienced / Competent / Trusted
Enough lookouts at good vantage points
Knowledge of crew locations
Knowledge of escape and safety locations
Knowledge of trigger points
Map / Weather Kit / Watch / IAP

Communication(s)



Radio frequencies confirmed
Backup procedures and check-in times established
Provide updates on any situation change
Sound alarm early, not late

Escape Route(s)

More than one escape route
Avoid steep uphill escape routes
Scouted: Loose soils / Rocks / Vegetation
Timed: Slowest person / Fatigue & Temperature factors
Marked: Flagged for day or night
Evaluate: Escape time vs. Rate of spread
Vehicles parked for escape

Safety Zone(s)

Survivable without a fire shelter
Back into clean burn
Natural Features: Rock Areas / Water / Meadows
Constructed Sites: Clearcuts / Roads / Helispots
Scouted for size and hazards

Upslope? 
Downwind?  More heat  Larger Safety Zone
Heavy Fuels? 

Escape time and safety zone size requirements
will change as fire behavior changes.

Safety Zone Guidelines

- Avoid locations that are downwind from the fire.
- Avoid locations that are in chimneys, saddles, or narrow canyons.
- Avoid locations that require a steep uphill escape route.
- Take advantage of heat barriers such as lee side of ridges, large rocks, or solid structures.
- Burn out safety zones prior to flame front approach.
- For radiant heat only, the distance separation between the firefighter and the flames must be at least four times the maximum flame height. This distance must be maintained on all sides, if the fire has ability to burn completely around the safety zone.

Convective heat from wind and/or terrain influences will increase this distance requirement.

CALCULATIONS ASSUME NO SLOPE AND NO WIND

Flame Height	Distance Separation (firefighters to flame)	Area in Acres
10 ft.	40 ft.	1/10 acre
20 ft.	80 ft.	1/2 acre
50 ft.	200 ft.	3 acres
75 ft.	300 ft.	7 acres
100 ft.	400 ft.	12 acres
200 ft.	800 ft.	50 acres

Distance Separation is the radius from the center of the safety zone to the nearest fuels. When fuels are present that will allow the fire to burn on all sides of the safety zone this distance must be doubled in order maintain effective separation in front, to the sides, and behind the firefighters. Area in Acres is calculated to allow for distance separation on all sides or a three person engine crew. One acre is approximately the size of a football field or exactly 208 feet x 208 feet.

Downhill Checklist

Downhill fireline construction is hazardous in steep terrain, fast-burning fuels, or rapidly changing weather.

Downhill fireline construction should not be attempted unless there is no tactical alternative. When building downhill fireline, the following is required:

1. Crew supervisor(s) and fireline overhead will discuss assignments prior to committing crew(s).
Responsible overhead individual will stay with job until completed (TFLD or ICT4 qualified or better).
2. Decision will be made after proposed fireline has been scouted by supervisor(s) of involved crew(s).
3. L.C.E.S. will be coordinated for all personnel involved.
 - Crew supervisor(s) is in direct contact with lookout who can see the fire.
 - Communication is established between all crews.
 - Rapid access to safety zone(s) in case fire crosses below crew(s).
4. Direct attack will be used whenever possible; if not possible, the fireline should be completed between anchor points before being fired out.
5. Fireline will not lie in or adjacent to a chute or chimney.
6. Starting point will be anchored for crew(s) building fireline down from the top.
7. Bottom of the fire will be monitored; if the potential exists for the fire to spread, action will be taken to secure the fire edge.

Strategy - *Direct Attack*

Advantages

- Minimal area is burned; no additional area is intentionally burned.
- It's the safest place to work; firefighters can usually escape into the burned area.
- The possibility of fire moving into the brush or crowns of trees is reduced.
- The uncertainties of burning out or back-firing can be reduced/eliminated.

Disadvantages

- Firefighters can be hampered by heat, smoke and flames.
- Control lines can be very long and irregular because the line follows the edge of the fire.
- Burning material can easily spread across midslope lines.
- May not be able to use natural or existing barriers.
- More mop-up and patrol is usually required.

Strategy - *Indirect Attack*

Advantages

- The line can be located along favorable topography.
- Natural or existing barriers can be used.
- Firefighters may not have to work in smoke and heat.
- The line can be constructed in lighter fuels.
- There may be less danger of slopovers.

Disadvantages

- More area will be burned.
- Must be able to trade time and space to allow line to be constructed and fired.
- Firefighters may be placed in more danger because they are distant from the fire and can't observe it.
- There may be some dangers related to burning out or backfiring.
- Burning out may leave unburned islands of fuel.
- May not be able to use line already built.

Wildland-Urban Watch Outs

- Poor access and narrow one-way roads
- Bridge load limits
- Wooden construction and wood shake roofs
- Powerlines, propane tanks, and HazMat threats
- Inadequate water supply
- Natural fuels 30' or closer to structures
- Structures in chimneys, box canyons, narrow canyons, or on steep slopes (30% or greater)
- Extreme fire behavior
- Strong winds
- Evacuation of public (panic)

Powerline Safety

- Downed conductor on vehicle: stay in vehicle until power company arrives. If the vehicle is on fire or fire is near, jump clear, but don't hang on. Keep feet together and bunny hop away.
- Smoke, water, and retardant are all good conductors and can cause powerline to ground arcing.
- Don't operate heavy equipment under powerlines.
- Don't use rights-of-way as a jump or cargo drop spot.
- Don't drive with long antennas under powerlines.
- Don't fuel vehicles under powerlines.
- Don't stand near powerlines during retardant drops.
- Don't park under powerlines.
- Don't apply straight stream to powerlines.

Structure Assessment Checklist

Address/Property Name

- Numerical street address, ranch name, etc.
- Number of residents on site

Road Access

- Road surface driveable
- Adequate width
- Turnouts, turnarounds
- Bridges (load limits)
- Stream crossings
- Grade (greater than 15%?)

Structure/Building

- Single residence/multi complex/out building
- Exterior walls
- Large unprotected windows facing heat source
- Proximity of any above-ground fuel tanks
- Roof material
- Eaves
- Other features (wood deck, wood patio cover and furniture, wood fencing)

Clearances/Exposures/Defensible Space

- Structure location (narrow ridge, canyon, midslope, chimney)
- Adequate clearance-minimum of 30'
(Steep slopes = more clearance)
(Heavier fuels = more clearance)
- Trees, ladder fuel, shrubs adjacent to structure
- Other combustibles near structure (wood piles, furniture, fuel tanks)
- Adequate clearance around fuel tank
- Powerlines or transformers

Hazardous Materials

- Chemicals, pesticides, herbicides, petroleum products, paint

Water Sources

- Hydrant/standpipe, storage tank, pool, hot tub, pond, irrigation ditch

Evacuation

- Identify safe evacuation routes and refuge
- Coordinate with on-scene law enforcement and emergency services personnel.

Estimated Resources for Protection

- Number(s) and type(s) of engines, water tenders, crews, dozers, aircraft.

Structure Protection Guidelines

Firefighter safety and survival is the number one priority.

Equipment Placement

- Identify escape routes and safety zones.
- ALWAYS STAY MOBILE.
- Back equipment in for quick escape.
- Mark entrance to long driveways to show that protection is in place.
- Park in a cleared area.
- Keep egress route clear.
- Have protection line charged.
- DO NOT make long hose lays.
- Keep sight contact with all crewmembers.

Water Use Guidelines

- Keep at least 100 gallons reserve.
- Top off tank at every opportunity.
- CONSERVE WATER. Apply water only if it controls fire spread or significantly reduces heating of structure.
- Keep fire out of the heavier fuels.
- Knock down fire in the lighter fuels.
- Have enough water to last duration of main heat wave and to protect crew.

Class A Foam Use Guidelines

- Direct Attack - apply to base of flame.
- Indirect Attack - lay out wet line and burn out.
- Apply to structure (roof and siding) 10-15 minutes before fire arrives.

Preparing Structure

- Determine if residents are home.
- Place ladder on side with least fire threat and away from power drop.
- Clean roof of combustible materials.
- Cover vents.
- Remove and scatter fuels away from structure (ladder fuels, wood piles, etc.).
- Clear area around above-ground fuel tank, shutting off tank.
- Place combustible outside furniture inside structure.
- Close windows and doors, including garage, leaving unlocked. AS A LAST RESORT, YOU MAY NEED TO USE STRUCTURE AS REFUGE.
- Have garden hose(s) charged.

INCIDENT COMPLEXITY ANALYSIS (Type 3, 4, 5)	Yes	No
Fire Behavior		
Fuels extremely dry and susceptible to long-range spotting or you are currently experiencing extreme fire behavior.		
Weather forecast indicating no significant relief or worsening conditions.		
Current or predicted fire behavior dictates indirect control strategy with large amounts of fuel within planned perimeter.		
Firefighter Safety		
Performance of firefighting resources affected by cumulative fatigue.		
Overhead overextended mentally and/or physically.		
Communication ineffective with tactical resources or dispatch.		
Organization		
Operations are at the limit of span of control.		
Incident action plans, briefings, etc. missing or poorly prepared.		
Variety of specialized operations, support personnel or equipment.		
Unable to properly staff air operations.		
Limited local resources available for initial attack.		
Heavy commitment of local resources to logistical support.		
Existing forces worked 24 hours without success.		
Resources unfamiliar with local conditions and tactics.		
Values to be protected		
Urban interface; structures, developments, recreational facilities, or potential for evacuation.		
Fire burning or threatening more than one jurisdiction and potential for unified command with different or conflicting management objectives.		
Unique natural resources, special-designation areas, critical municipal watershed, T&E species habitat, cultural value sites.		
Sensitive political concerns, media involvement, or controversial fire policy.		

After Action Review

What was planned?

- Review the primary objectives and expected action plan.

What actually happened?

- Review the day's actions:
 - Identify and discuss effective and non-effective performance.
 - Identify barriers that were encountered and how they were handled.
 - Discuss all actions that were not standard operating procedure, or those that presented safety problems.

Why did it happen?

- Discuss the reasons for ineffective or unsafe performance. Concentrate on WHAT, not WHO, is right.

What can we do next time?

- Determine lessons learned and how to apply them in the future.

How to Properly Refuse Risk

Every individual has the right and obligation to report safety problems and contribute ideas regarding their safety. Supervisors are expected to give these concerns and ideas serious consideration. **When an individual feels an assignment is unsafe they also have the obligation to identify, to the degree possible, safe alternatives for completing that assignment.** Turning down an assignment is one possible outcome of managing risk.

A “turn down” is a situation where an individual has determined they cannot undertake an assignment as given and they are unable to negotiate an alternative solution. The turn down of an assignment must be based on an assessment of risks and the ability of the individual or organization to control those risks. Individuals may turn down an assignment as unsafe when:

1. There is a violation of safe work practices.
2. Environmental conditions make the work unsafe.
3. They lack the necessary qualifications or experience.
4. Defective equipment is being used.

- Individual will directly inform their supervisor that they are turning down the assignment as given.

The most appropriate means to document the turn down is using the criteria (The Firefighting Orders, the Watch Out Situations, etc.) outlined in the Risk Management Process.

- Supervisor will notify the Safety Officer immediately upon being informed of the turn down. If there is no Safety Officer, notification shall go to the appropriate Section Chief or to the Incident Commander. This provides accountability for decisions and initiates communication of safety concerns within the incident organization.

- If the supervisor asks another resource to perform the assignment, they are responsible to inform the new resource that the assignment has been turned down and the reasons that it was turned down.

- If an unresolved safety hazard exists or an unsafe act was committed, the individual should also document the turn down by submitting a SAFENET (ground hazard) or SAFECOM (aviation hazard) form in a timely manner.

These actions do not stop an operation from being carried out. This protocol is integral to the effective management of risk as it provides timely identification of hazards to the chain of command, raises risk awareness for both leaders and subordinates, and promotes accountability.

Last Resort Survival

LOOK AT YOUR OPTIONS AND IMMEDIATELY ACT ON THE
BEST ONE!

UTILIZE ALL P.P.E.!
PROTECT YOUR AIRWAY!

Escape if you can:

- Drop any gear not needed for fire shelter deployment (keep your fire shelter, handtool, quart of water, and radio).
- You may be able to use the fire shelter for a heat shield as you move.
- In LIGHT FUELS, you may be able to move back through the flames into the black.
- If you are on the flank of the fire, try to get below the fire.
- Consider vehicles or helicopters for escape.

Find a survivable area:

- Stay out of hazardous terrain features.
- Use bodies of water that are more than 2 feet deep.
- In LIGHT FUELS, you may be able to light an escape fire.
- In other fuels, you may be able to light a backfire.
- Call for helicopter or retardant drops.
- Cut and scatter fuels if there is time.
- Use any available heat barriers (structures, large rocks, dozer berms).
- Consider vehicle traffic hazards on roads.

Pick a fire shelter deployment site:

- Find the lowest point available.
- Maximize distance from nearest aerial fuels or heavy fuels.
- Pick a surface that allows the fire shelter to seal and remove ground fuels.
- Get into the fire shelter before the flame front hits.
- Position your feet toward the fire and hold down the fire shelter.
- Keep your face pressed to the ground.
- Deploy next to each other and keep talking.

Expect:

- Extremely heavy ember showers.
- Superheated air blast to hit before the flame front hits.
- Noise and turbulent powerful winds hitting the fire shelter.
- Pin holes in the fire shelter that allow fire glow inside.
- Heat inside the shelter = Extreme heat outside.
- Deployments have lasted up to 90 minutes.
- When in doubt wait it out.